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# Painting Work Procedure

## 涂装施工工艺

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## 1. Scope and purpose 范围及目的

The painting work procedure covers the requirements of the coatings application which has been recommended from International Paints, in which it also describes the repair and touch-up methods of painting on the jobsite to ensure the coatings' performance and lay down a set of recommended practices required to obtain an optimal service life of coatings in corrosive environments. The painting work procedure shall not replace any current approved document and specification.

本施工工艺涵盖了国际油漆推荐的涂层系统施工的基本要求，也包括了现场的漆膜修补方法，以确保涂层的应用性能。它设定了一套推荐的施工方法以便于该涂料在腐蚀环境中能获得最佳的使用寿命。本涂装施工工艺不取代任何现行的正式文件或涂装规范。

## 2. Coating System 油漆配套

Surface Preparation 表面处理	Abrasive blast cleaning to ISO8501-1 Sa2 <sup>1</sup> / <sub>2</sub> or SSPC SP 6, obtain a sharp angular surface profile in 40-75 microns. 采用磨料喷砂处理至 ISO8501-1 Sa2.5 或 SSPC SP6, 粗糙度达到 Rz=40-75 微米	
Coat No. 涂层道数	Product Name 产品名称	DFT Specified 设计干膜厚度 (µm/微米)
Primer Coat 底漆	Epoxy Zinc-rich Primer Interzinc 1065 环氧富锌底漆	90
Intermediate Coat 中间漆	High Build Epoxy Paint Intergard 475HS 厚浆型环氧云铁中间漆	80
Topcoat 面漆	Polyurethane Finish Interthane 990 聚氨酯面漆	80
Total DFT 总干膜厚		275

## 3. Surface Preparation 表面处理

### 3.1 Steelwork preparation 钢结构处理

In order to provide surfaces which will ensure optimum paint performance, prior to blast cleaning, weld defects such as pinholes and discontinuities shall be repaired. Sharp edges and flame-cut edges shall be reduced by grinding. Welds shall be smooth and free of all weld slag and weld spatter.

为了保证钢结构表面能够使涂料发挥性能，在喷砂前对电焊缺陷，如气孔和非连续焊等要进行修正。锐边和火焰切割边缘要打磨光滑。焊缝要光滑无焊渣和飞溅等。

### 3.2 Degreasing 除油

Prior to blasting, all deposits of grease or oil or humectants caused by the NDT test shall be removed from the surface in accordance with SSPC-SP1 "Solvent Cleaning".

喷砂前，除去油脂或探伤拍片留下的润湿剂，按照 SSPC-1 "溶剂清洁" 标准执行。

### 3.3 Abrasives 磨料

Blasting abrasives shall be dry, clean, free from oil & grease and other contaminants, which will not be detrimental to the performance of the coating. Conductivity of aqueous extract should be lower than 300µs/cm. Beach sand shall not be used.

喷射用磨料要干燥，无油污，清洁无杂物，不能对涂料的性能有影响。磨料的导电率将不得到高

于 300 $\mu$ s/cm。河砂将不得用于喷砂使用。

Size of abrasive particles for blast cleaning shall be such that the prepared surface profile height (anchor pattern profile) is in accordance with the requirements for the applicable coating system. Steel grits and shots size should be 1.0-1.2mm. The surface profile shall be graded in accordance with ISO 8503.

磨料的大小要能够产生规定涂料系统要求的粗糙度。钢丸和钢砂的大小在 1.0-1.2mm。表面粗糙度级别根据 ISO8503 进行评估。

During the blasting operation care must be taken to prevent the possibility of oil and/or water to contaminate the blasted surface. Compressors must accordingly be fitted with efficient oil and water traps.

喷砂时注意防止油和 / 或水对喷砂后钢材表面的污渍。空压机必须安装油水分离器。

### 3.4 Blasting 喷砂

All steel surface shall be blasting cleaned to ISO 8501-1 Sa2 ½ or SSPC-SP6 with surface profile Rz 40-75 $\mu$ m.

钢材表面要求喷砂清理到 ISO 8501—1 Sa 2½ 或则 SSPC-SP6 等级，粗糙度达到 Rz 40—75 微米。

The surface to be coated shall be clean, dry, free from oil/grease, and have the specified roughness and cleanliness until the first coat is applied. All dust must be removed completely. The quantity of dust shall be less than "Rating 2" according to ISO 8502-3.

喷砂后准备涂漆的钢材表面要清洁、干燥，无油脂，保持粗糙度和清洁度直到第一度漆喷涂。所有灰尘要求彻底清理，根据 ISO8502—3 灰尘量要小于 2 级。

Coatings shall be applied within 4 hours of surface preparation and/or before rust bloom occurs. Should visible rusting occur or the cleaned surface becomes wet or otherwise contaminated, the surface shall be re-cleaned to the degree previously required.

表面处理 4 个小时内，或在钢材表面返黄前，就要涂漆。如果钢材表面有可见返锈现象，变湿或者被污染，要求重新清理到前面要求的级别。

### 3.5 Stripe Coating 预涂

Stripe coating is an essential part of good working practice, Stripe coats are applied to areas where it is difficult to get the required coverage, including but not limited to:

- Plate edges
- Welds
- Pipes
- Ladders
- Difficult access areas

预涂是良好工作方法的重要部分,预涂一般在那些难以达到要求的覆盖处,包括但不限于下列部位:

- 自由边
- 焊缝
- 管路
- 梯子
- 难以触及的地方

#### 4. Application of Primer Interzinc 1065 环氧富锌底漆施工

##### 4.1 Mixing 混合

Mixing ratio: Part A : Part B = 2:1(by volume)

Once mixed it is recommended that the material is filtered using 80–100 mesh

混合比例：A 组分 : B 组分 = 2 : 1 (体积比)

Material is supplied in two containers as a unit. Always mix a complete unit in the proportions supplied. Once the unit has been mixed it must be used within the working pot life specified.

(1) Agitate Base (Part A) with a power agitator.

(2) Combine entire contents of Curing Agent (Part B) with Base (Part A) and mix thoroughly with power agitator.

涂料分两个包装，记着一定要按比例混合一套涂料，一套涂料混合好后，必须在规定的混合使用寿命内用完。先使用机械搅拌器搅拌 A 组分，把全部的固化剂倒入基料 A 组分，机械搅拌均匀。

##### 4.2 Thinning 稀释

Interzinc 1065 shall not require thinning, but in some extreme circumstances, the addition of 5% of thinner GTA 822 can be used to aid application performance.

通常不需要进行稀释，但在些特殊情况下，加入 5% 的 GTA 822 将有助于提高喷涂施工性能。

Thinning ratio will be adjusted according to temperature, spray pump pressure.

稀释剂用量将根据大气温度，喷漆泵压力进行调整。

##### 4.3 Pot life 混合使用时间

Temp. °C 温度	5°C	15°C	25°C	40°C
Pot-life, 使用时间, 小时	3 hrs	2.5 hrs	2 hrs	1 hrs

Once the pot life has been exceeded, no attempt should be made to apply paint.

一旦混合使用时间超过，不要再进行涂料的施工。

##### 4.4 Application Methods 施工方法

Airless spray is recommended, the paint reservoir should keep a regular agitating between whiles.

推荐使用高压无气喷涂，施工时涂料罐须不时地进行搅拌。

Tip size: 0.43~.0.53mm (0.017"~0.021")

枪嘴孔径: 0.43~.0.53mm (0.017~0.021")

Total output fluid pressure at spray tip not less than 191 kg/cm<sup>2</sup>.

枪嘴处流体压力不低于: 191kg/cm<sup>2</sup>

##### 4.5 Drying and Over-coating 干燥和重涂

Temperature 温度	Touch Dry 表干, 分钟	Hard Dry 硬干, 小时	Over-coating Interval with itself 推荐自重涂间隔	
			Min. 小时	Max. 小时
5°C	20 min	8 hrs	8 hrs	Extended, 无

15°C	15 min.	6 hrs	6 hrs	Extended, 无
25°C	10 min	4 hrs	4 hrs	Extended, 无
40 °C	5 min	2.5 hrs	2.5 hrs	Extended, 无

- Interzinc 1065 will not cure adequately below 5°C. The ambient curing temperature should be above 10°C for maximum performance of coatings.

本产品低于 5°C 时无法固化完全，为获得最佳性能，其固化温度应在 10°C 以上。

- After weathering, Interzinc 1065 should be dry and free from all contamination especially zinc salt before Over-coating. If white zinc salts have formed on the surface they must be removed.

经过长时间的暴露风化，漆膜表面要干燥无污物和锌盐。如果表面已经形成白色锌盐，必须完全除去以后才能涂道漆。

#### 4.6 Dry Film Thickness

In order to ensure good anti-corrosive performance, it is important to achieve minimum DFT of 40 microns; care should be exercised to avoid the application of DFT in excess of 150 microns 为了获得良好的防腐性能，Interzinc1065 涂层的最小干膜厚度须达到 50 微米，最大的干膜厚度不应超过 150 微米。

### 5. Application of Intergard 475HS 环氧云铁中间漆的施工

#### 5.1 Mixing 混合

Mixing ratio: Part A : Part B=3:1 (by volume)

Material is supplied in two containers as a unit. Always mix a complete unit in the proportions supplied. Once the unit has been mixed it must be used within the working pot life specified.

(1) Agitate Base (Part A) with a power agitator.

(2) Combine entire contents of Curing Agent (Part B) with Base (Part A) and mix thoroughly with power agitator.

混合比：A 组分 : B 组分 = 3 : 1 (体积比)

涂料分两个包装，记着一定要按比例混合一套涂料，一套涂料混合好后，必须在规定的混合使用寿命内用完。

先使用机械搅拌器搅拌 A 组分

把全部的固化剂倒入基料 A 组分，机械搅拌均匀

#### 5.2 Thinning 稀释

Intergard 475HS thinning with 5-10% of GTA007 will gain good spraying surface. Thinning ratio will be adjusted according to temperature, spray pump pressure.

Intergard 475HS 用 GTA007 稀释 5-10% 左右将有助于良好的喷涂施工。稀释剂用量将根据温度，

喷漆泵压力进行调整。

### 5.3 Pot life 混合使用时间

Temp. °C 温度	-5°C	5°C	10°C	15°C	25°C	40°C
Pot-life, 使用时间, 小时	1 hrs	1 hrs	1 hrs	1 hrs	1 hrs	N/A 不适用

The paint cannot be used once the pot life exceeds.

如果超过规定的混合使用寿命，涂料将不可以再使用。

When the temperature is above 25°C, the corresponding high temperature curing agent should be applied. Use of the topical grade curing agent will give a pot life of 2 hrs at temperatures between 25~40°C.

当温度超过 25°C时，要使用相应的高温固化剂。热天使用的固化剂在 25—40°C时，混合使用寿命可以达到 2 小时。

### 5.4 Application 施工

Airless spraying would be preferred. Tip range 0.53-0.63 mm (0.021-0.025”), Total output fluid pressure at spray tip not less than 190 kg/cm<sup>2</sup> (2,700 p.s.i.)

使用无气喷涂。枪嘴 0.53-0.63 mm (0.021-0.025” ), 枪嘴处压力不低于 190 kg/cm<sup>2</sup>。

### 5.5 Drying and over-coating 干燥和重涂

Temperature 温度	Touch Dry 表干, 小时	Hard Dry 硬干, 小时	Over-coating Interval with recommended topcoats 推荐面漆的重涂	
			Min. 小时	Max. 小时
-5°C	2.5 hrs	48 hrs	48 hrs	Extended, 无限制
5°C	1.5 hrs	16 hrs	16 hrs	Extended, 无限制
15°C	1 ¼ hrs	10 hrs	10 hrs	Extended, 无限制
25°C	1 hrs	5 hrs	5 hrs	Extended, 无限制

Note: For curing at elevated temperatures an alternative curing agent is available.

注：高温要使用相应的高温固化剂。

Elevated temperature curing 高温下的固化

Temperature 温度	Touch Dry 表干, 小时	Hard Dry 硬干, 小时	Over-coating Interval with recommended topcoats 推荐面漆的重涂	
			Min. 小时	Max. 小时
25°C	1.5 hrs	6 hrs	6 hrs	Extended, 无限制
40°C	1 hrs	2 hrs	2 hrs	Extended, 无限制

## 6. Application of Interthane 990 聚氨酯面漆施工

### 6.1 Mixing 混合

Mixing ratio: Part A :Part B = 6:1 (by volume)

混合比: A 组分 : B 组分 = 6 : 1 (体积比)

The bas component Part A should be mixed thoroughly by mechanical agitation and then the curing agent Part B poured in and the composite agitate thoroughly.

先对 A 组份 (基料) 进行机械搅拌均匀, 然后倒入固化剂彻底搅拌。

Always mix a complete unit in the proportions supplied. The curing agent is moisture sensitive.

Once the curing agent container has been opened for partial mixing of a unit, when resealed the moisture in the air that replaces the liquid removed will begin reacting with the remainder of the curing agent.

请务必整套的涂料进行混合使用。因为固化剂对湿气比较敏感, 一旦固化剂桶打开后, 如果只是部分地使用固化剂, 重新盖上以后, 空气中的湿气就会留在桶内与余下的固化剂起反应。

### 6.2 Thinning 稀释

Normally no need for thinning, however, thinning by 5-10% with GTA713 can aid spraying application and provide a significant gloss surface finish.

通常不需要进行稀释, 然而, 加入 5-10% 的稀释剂 GTA713 将有助于无气喷涂施工, 给予涂层光洁的表面。不可使用其它稀释剂替代, 尤其是含酮类稀释剂。

### 6.3 Pot life 混合使用时间

Temp. 温度	-5°C	5°C	15°C	25°C	40°C
Pot-life 使用时间, 小时	26 hrs	12 hrs	4 hrs	2 hrs	45 min 分钟

Once the pot life has been exceeded, no attempt should be made to apply paint.

一旦混合使用时间超过规定, 不要再试图使用该涂料。

### 6.4 Application 施工方法

Airless spray is always recommended.

Pump ratio: min. 45:1

Input pressure: min. 4-5 kg/cm<sup>2</sup>

Tip range: 0.33 – 0.45mm (13-18")

Min. Pressure at Nozzle 176kg/cm<sup>2</sup>

推荐使用高压无气喷涂。

喷漆泵压力: 至少 45 : 1

进气压力: 4-5 kg/cm<sup>2</sup>

枪嘴大小: 0.33 – 0.45mm (13-18")

最小枪口压力: 150kg/cm<sup>2</sup>

Suitable gloss of surface could be obtained by air spray but 10-20% thinner might be added probably. Cross spray shall be applied to achieve the DFT specified, in this case two coats of paint could be applied.

空气喷涂可以更好地获得表面光洁度, 可能需要加入 10-20% 的稀释剂。为了达到规定膜厚, 可

能需要交叉多道施工才能达到规定膜厚。可以采用两道施工的方法。

Brushing and rolling could be used but only for the application of some partial areas.

刷涂和辊涂也可以使用，但是仅局限于部位的施工。

The various application methods shall be avoidable to obtain uniform appearance and gloss of paint surface.

为了达到均匀一致的表面外观和光泽，最好尽量避免多种施工混用。

#### 6.5 Drying/Over-coating 干燥和重涂间隔

Temperature 温度	Touch Dry 表干, 小时	Hard Dry 硬干, 小时	Over-coating Interval 自重涂间隔, 小时	
			Min. 最小	Max. 最大
5°C	5 hrs	24 hrs	24 hrs	Extended 无限制
15°C	2.5 hrs	10 hrs	10 hrs	Extended 无限制
25°C	1.5 hrs	6 hrs	6 hrs	Extended 无限制
40°C	1 hrs	3 hrs	3 hrs	Extended 无限制

#### 7. Touch Up on site 现场修补

7.1 Touch-up on site shall be carried out on all damaged coating surface, including damages resulted from transportation, handling, erection, and welding, cutting and any other hot-work.

所有损伤的涂层都要在现场进行修补工作，包括运输、装卸、架设，电焊、切割以及其它所有的火工所造所漆膜损伤。

7.2 Intact coating around damaged area must be feathered and slightly roughened the adjacent surface to ensure a smooth touch up coating surface.

损伤部位的周边完好涂层必须轻轻打毛，并打磨成平滑的过渡层，保证修补部位平滑过渡。

7.3 Prior to touch-up, damages assessment should be known then to get a touch-up plan. Touch-up should be carried out starting with the right damaged coat.

修补工作开始前，要先对漆膜损伤有一个评估然后做出修补计划。修补总是从损坏的那一涂层开始。

#### 7.4 Touch-up 修补方案

- Topcoat damaged (intact primer)

Sandpapering (80-100 mesh) or disc grinding, cleaned with Thinning then touched up with intermediated coat to reach specified DFT, followed with top coat.

面漆损伤（底漆完整）

用 80-100 目的砂纸打磨或砂轮片打磨，用稀释剂清洁表面后，修补中间漆至设计膜厚，再补涂面漆。

- Primer Damaged (no rust)

Sandpapering (80-100 mesh) primer surface, touch up primer to reach specified DFT, followed with intermediated coat and top coat.

底漆损伤（没有锈）

用 80-100 目的砂纸打磨，修补底漆至设计膜厚，再修补中间漆和面漆。

- Damaged to steel surface or burn area (rust noticed)

Disc Grinding to St3, cleaned with thinner and touched up with primer to reach specified DFT, followed with intermediated coat and top coat.



损伤到钢板，漆膜烧坏部位（返锈）

砂纸片打磨至 St3 级后，用底漆修补至设计干膜厚度，再修补中间漆和面漆。

- 7.5 Power tools can be used for grinding, rotary grinders, discs are recommended. However, rotary brush is not recommended because of its polishing tendency on steel surface to affect coating adhesion.

打磨时采用的动力工具，如旋转式打磨机，砂纸片等。然而，旋转钢丝刷不建议使用，因为它对钢板表面的抛光的作用而影响涂层附着力。

- 7.6 All climate control requirements should be same as it in new construction painting.

修补时期的气候条件控制相同于新建结构涂装时的要求。

- 7.7 Brush only used for small area, and more coat required to reach specified DFT. Airless spraying is recommended for big area touch-up.

刷涂仅限用于小范围修补，且修补必须达到规范所规定的设计干膜厚度。大面积修补时推荐使用无气喷涂。

- 7.8 During touch-up inside, sufficient ventilation and lighting must be provided.

内部修补时，要提供足够的通风和照明。

## 8. General Notes 概述

- 8.1 When temperature is lower than 5°C or higher than 40°C, according measures must be taken to improve ambient weather condition to the acceptable range.

当温度低于 5°C 或高于 40°C 时，必须采取措施来提高气候条件到可以接受的范围。

- 8.2 No final blast-cleaning or coating application shall be done if the relative humidity is more than 85% and when the steel temperature is less than 3°C above the dew point.

如果相对湿度超过 85% 或者钢板温度低于露点 3°C，不要进行最终喷砂或涂漆施工。

- 8.3 Paint application is not allowed when raining, snowing, water or ice on the substrates, or heavy fog around.

当下雨下雪，表面有水有冰，或者大雾时，不能进行涂漆施工。

- 8.4 Wet Film Thickness 湿膜厚度测量

WFT must be measured immediately after application since evaporation of solvents will effect the reading if not performed at once. WFT measurements shall be performed in accordance with ISO 2801:1997 Method No 1 (Appendix I).

湿膜厚在施工后应当立即检测，因为若不及时执行，溶剂的挥发将影响到读数。湿膜厚的检测应当依据 ISO 2801:1997 方法 No1（附录 1）执行。

WFT measurements as specified to be carried out alongside with checking of paint consumption, taking into consideration specified dry film thickness and volume solids of the paint.

湿膜厚的检测可反映油漆用量的检查，同时也有助于控制规定的干膜厚和反映油漆的固体含量。

- 8.5 Dry Film Thickness 干膜厚度测量

Number of spot readings to be performed is decided from case to case since design of coated

construction must be taken into consideration. One spot reading is the average of 3 readings made approximately 40mm apart.

读数点的数量应当根据不同的情况来执行，因为需要考虑到被涂装结构的不同设计。一点的读数应当是距其 40 毫米范围内其它三点的平均值。

Destructive methods to determine DFT of coating systems is not recommended but may be used if necessary to verify compliance with specifications.

不推荐使用破坏性方法测定干膜厚，但是为了检验是否符合配套而必须时也可使用。

DFT inspection should be carried out 90-10 rules, means 90% readings should be reach Specified DFT, and remaining 10% readings should reach 90% of specified DFT. DFT inspection will be carried out according SSPC PA 2.

干膜厚度的测量按照两个 90% 执行，即 90% 的测量点要达到规定的干膜的厚度，余下 10% 的测量点要达到规定膜厚度的 90%。干膜厚度的检查按照 SSPC PA2 执行。

## 8.6 Final Inspection 最终检验

Final coating surface should be clean, smooth, free of blistering, runs, pinholes, cracking, and drying spraying.

最终的漆膜表面应该清洁，平滑，无起泡，流挂，针孔，开裂和干喷等。